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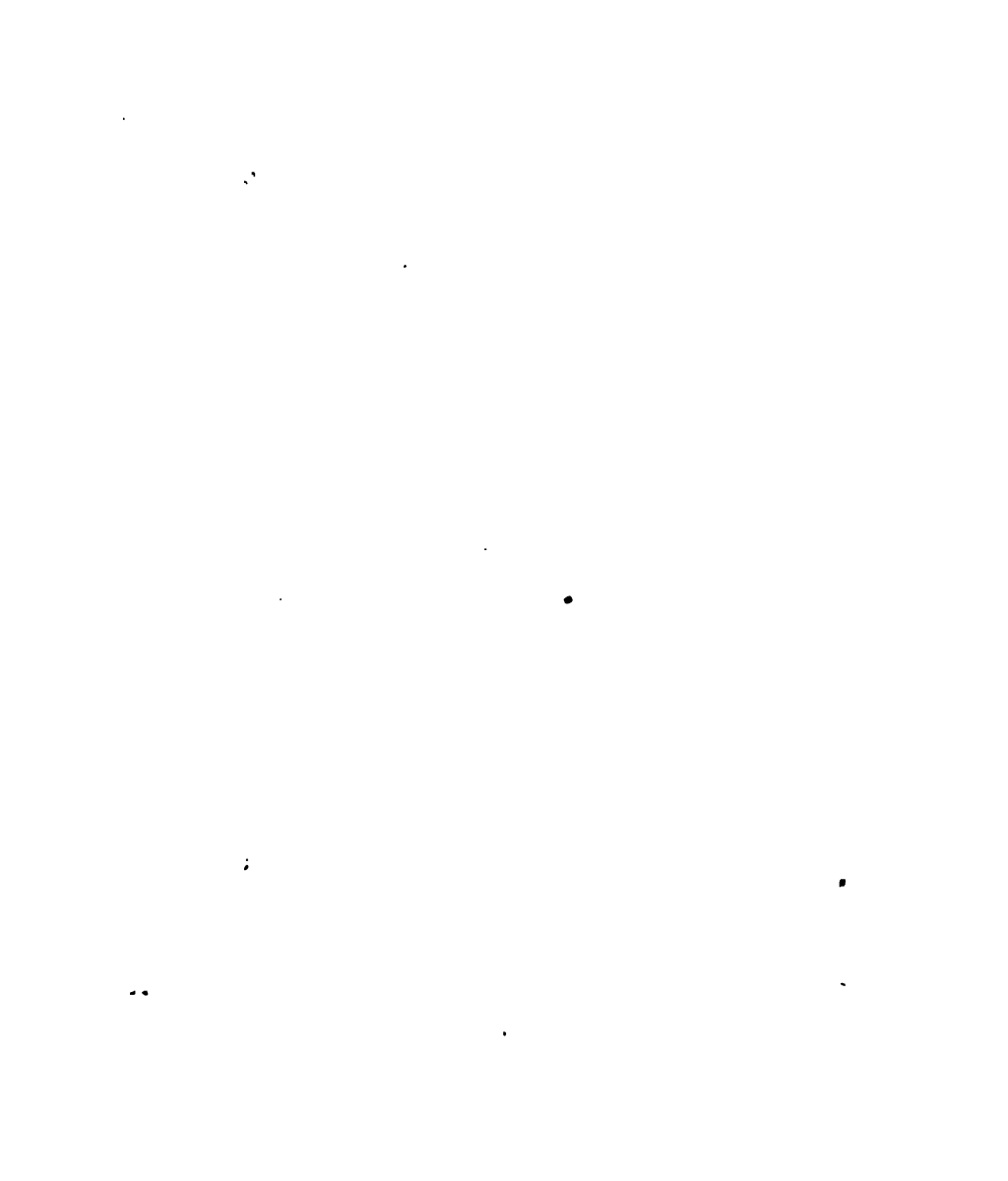
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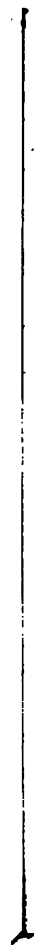
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A

NEW THEORY OF ASTRONOMY.

DEDUCED FROM

THE LATEST DISCOVERIES.

"Ancient time was the youth of the world."

"Magna est veritas et prevalebit."

"He telleth the number of the stars : He calleth them all by their names." Ps. cxlvii. 4.

"They continue this day according to thine ordinances." Ps. cxix. 91.

DUBLIN :

P. DIXON HARDY AND SONS,

23, UPPER SACKVILLE-STREET.

LONDON : PIPER, STEPHENSON, AND CO. PATERNOSTER-RROW.

1857.

1842 c. 4.

"I persuade myself, that the life and faculties of man, at the best but short and limited cannot be employed more rationally and laudably, than in the search of knowledge. * * In these enquiries, therefore, wherever I perceive a glimmering of truth before me, I readily pursue and endeavour to trace it to its source, without any reserve or caution of pushing the discovery too far. * * * I look upon the discovery of anything which is true as a valuable acquisition to society ; which cannot possibly hurt or obstruct the good effect of any other truth whatsoever ; for they all partake of one common essence, and necessarily coincide with each other, and, like the drops of rain, which fall separately into the rivers, mix themselves at once with the stream, and strengthen the general current."—Midleton's *Free Enquiry*.



A NEW THEORY OF ASTRONOMY.

1. ASTRONOMY the most delightful and sublime of all the sciences, unfortunately has been encumbered by writers on the subject, with so many technicalities, as to deter the generality of persons from its study ; and even where efforts have been made to render it intelligible, the present theory of astronomy, fails to carry the mind convincingly along.— Hence, what are asserted to be demonstrated facts, appear to the intelligent observer, altogether different from the ideas he has formed when contemplating the heavens ; and the study is soon given up or neglected, because it is unsatisfactory to the mind.

2. Few probably would venture to risk this opinion, knowing how assuredly its assertion would bring down upon them the ridicule and contempt of the learned, and of those who imagine that the subject was once and for ever settled some three centuries since.

But if there were errors before that period, may there be errors still? Have no discoveries been made for the last three hundred years, to call forth a new astronomical theory—Doubtless, discoveries most important to this science have been made. How is it then that we hear so little about them? Are astronomers unwilling to acknowledge to the world that they have been so long deceived, that what considered to be the most perfect of the sciences, is based upon erroneous principles. Or is it that they choose to go on without examining whether these great discoveries do not interfere with their theory?

3. Have we no laborious and persevering men in these days, who would, like those in former times, take such work in hand? or are they determined to content themselves with telescopic discoveries, *without making any application of them* to the present theory of Astronomy, to which should be remembered we are not indebted for the accuracy of astronomical prediction—inasmuch as the mean motions of the sun, moon, and planets, were known to a second, five or six thousand years before, as well as the latitudes of planets, and motions of the earth and moon's nodes.

4. The present, or, as it is called, the Copernican theory of astronomy, teaches, that the sun is *at rest* in the centre of the System ; and that the planets move round him in elliptical orbits from west to east, and that the apparent diurnal motion of the heavenly bodies from east to west, is owing to the earth turning on her axis from west to east daily. Such is the Copernican theory of astronomy. .

5. But within the last few years it has been discovered that the sun *is not at rest* in the heavens, but is pursuing his course at a prodigious rate. In fact it is now acknowledged, that nothing is *at rest* in the heavens : sun, moon, stars, planets, satellites, all are in motion. Each has its place allotted in which it moves in perfect harmony, as when first “the morning stars sang together, and all the sons of God shouted for joy.”

6. Another most important discovery has been made of orbital motion in the double stars. It was supposed to be a law of the solar system, that the smaller bodies revolved about the larger ; but this supposed analogy has been destroyed by the late discovery of the binary or double stars,

revolving about each other. Thousands of those stars have been discovered, so that it is an ascertained fact that the stars or suns have motion as well as the planets, and are physically connected—probably by being *crught* in the whirl of each other's rapid motion—numbers of them describing orbits together. So that the same laws of motion which direct the planets in their courses, and connect them with the sun, likewise operate in these systems of stars.

7. Another very wonderful discovery is that of the periodical or variable stars—as they are termed—which appear and disappear, even while they are being examined with a telescope. So that one of these stars may be distinctly observed to decline in brightness for four hours, until it becomes scarcely visible, and in the next four hours it increases in lustre, and by slow degrees assumes its original brightness continuing so for two days and a half, after which its diminution again commences.

Numbers of these stars have been discovered requiring different periods to complete their changes, some requiring a year, and others many years. Another of these stars remains in its greatest brightness—when it is nearly equal to

a star of the second magnitude—for a fortnight, after which it decreases for three months, until it becomes invisible, remaining so for five months, when it again becomes visible, and continues increasing during the remaining three months of its period, but does not always return to the same degree of brightness. Another variable star continues in full lustre for five years, decreasing for two years, is invisible to the naked eye for four years, and then increases slowly for seven years, and all these changes are completed in eighteen years.

8. Although “one star differeth from another star in glory,” and these stars *may* have dark spots which sometimes appear; yet the principal cause of their changes, no doubt, arises from their moving in orbits; their light diminishing as they recede from our view, and returning again as they approach nearer. Some stars are observed to have greater orbits than others, but it is no longer doubted that the stars move in orbits, whatever their periodic times may be.

9. Perhaps these most important discoveries may assist us in ascertaining what the motion of our sun may be, as well as that of the “fixed stars,” as they are erroneously termed,

resulting probably from the *figure* of these clusters or constellations never changing. We shall in another part of this essay, consider in what manner these clusters of stars are bound together, and at the same time moving in concert with each other. Let us not, therefore, be slow to acknowledge—reasoning from analogy—that the motion of the sun must be orbital.

10. But where is the sun? Is the sun in the centre of the system? And where is the earth? In endeavouring to ascertain these facts, let us apply to the consideration of this great question, the reason which God has given us, and we shall see what conclusions must necessarily be arrived at. In order to do this we must lay aside all preconceived notions and theories, and as we cannot determine it by day, let us some fine starlight night direct our attention to the Polar Star, which it is well known always points to the north pole of the earth. This star appears to describe a circle round the north pole of the heavens, and the earth therefore appears to describe a circle perfectly in unison with it from east to west every twenty four hours. Mark particularly the polar star. It forms the tip of the tail or extremity of

Ursa Minor, arranged like the constellation Ursa Major, but in a reverse order. *It points to the place occupied by the earth.* Then let us direct our attention to Ursa Major, best known by the name of "the plough," or "Charles' Wain," seven bright stars, four of which form an irregular square, and the other three stretching out from it, form a curve. The two stars of the square on the opposite side from the curve, always point to the polar star, and are therefore, called "the pointers." Having made these observations, and noted them carefully, let us on the following evening at sunset, trace the Zodiacal light, or the sun's course; then note the rising of Ursa Major, when it will appear evident the sun's course is in concert with this constellation, which is moving in a circle outside that described by Ursa Minor, and that its motion is from *east to west*.

Let us again observe the polar star pointing to the north pole of the earth, and determine whether the earth's orbit is not within that of the sun's course, the earth moving in unison with the polar star in Ursa Minor, which is in the centre of the circle described by Ursa Major, and the sun which has not long gone down appearing to move in unison with the latter constellation.

11. Should we suppose the sun to move in an orbit outside the orbit of the earth, and at ninety-five millions of miles from the earth, the sun would thus be placed between the orbits of Mars and Jupiter : and it has been calculated that there is an interval of more than three hundred and fifty millions of miles between these planets. The sun's orbit would be about five hundred and seventy millions of miles in circumference, if outside the orbit of the earth, to which opinion the Danish astronomer, Tycho Brahe, inclined.

12. Since then the sun is found to move, surely we cannot compare the velocity of his motion with anything on the earth. The sun's incomparable magnitude would render analogous argument absurd. For if three hundred and fifty thousand globes as large as the earth, were compacted together, they would only equal one sun ! a body the diameter of which is eight hundred and eighty-two thousand miles, and its circumference two millions seven hundred and seventy thousand miles. So that if all the planets and satellites of the solar system were moulded together into one single globe, that globe would not exceed the five hundredth part of the globe of the sun. In other words, the sun is five

hundred times the bulk of all the rest of the bodies of the solar system put together. Let us compare heavenly things with heavenly ; suppose the sun to move between six and seven thousand miles, or the thirtieth part of his own diameter, in every second of time, this would not be enormous ; and yet this rate of motion would allow of the sun completing a circle outside the orbit of the earth in about twenty-four hours.

13. The fact is that to convey the idea of distance in the heavens, by the little miles of the earth, is only confusing to the ideas, as it is quite evident, that none of the heavenly bodies *could* move but a few miles in any proportion of time that could be expressed. *We should use other terms, therefore, when we speak of the celestial bodies, to denote distance, by means of which the study of astronomy would be much simplified. Suppose we divide the diameter of each of the heavenly bodies into parts, and describe its motion by so many of these, in a given proportion of time ; so that an *astronomical mile*, should be one thousand of our miles. For instance, the earth is eight thousand miles in diameter—that is *eight astronomical* miles—suppose then, that we give to the earth

as the moon, the nearest of the heavenly bodies, and upon which we can most easily and with most certainty observe—does not turn upon her axis ; for if she did, we should see both sides of her ; whereas we never see but one hemisphere of the moon. If such was the motion of the heavenly bodies, it would certainly prevail in the moon ; and we should see her spinning round on her axis each night ; but there is nothing of the kind to be observed. She soars majestically, always presenting the same hemisphere to the earth ; whilst the planet Saturn is supposed by astronomers, to turn upon its axis in ten hours and a quarter, the moon is supposed to require a month to turn ; but the fact is, they never turn upon their axis at all ; for in that case, we must imagine the planets to have one motion, and the moon to have quite a different movement.

17. This theory of turning upon the axis, was invented to account for the succession of day and night, when it was supposed the sun was *at rest* in the centre of the system, and the *stars fixed*, “like diamonds in the sky ;” and at a time when men had but faint notions of velocity of movement, even on the earth. But it will no longer account for

the phenomena of the heavens. *The LATE discoveries demand a NEW THEORY.* Give to the *sun motion*, and to the *stars orbits*, and *unquestionably* the present astronomical system is *overthrown*, so that the world may be said in the present day, to be without any theory of astronomy !

18. If the stars, which are supposed to be suns, are found to have orbits, doubtless, our sun has an orbit. If then the sun moves in an orbit between the orbits of Mars and Jupiter, it follows that the outer planets, namely, Jupiter, Saturn, Uranus, and Neptune, enjoy a greater degree of the sun's light and heat than is supposed ; and it would need the strongest evidence to convince us, that this great luminary, which is intended to dispense light, heat and life, to surrounding worlds, and which is evidently the source of motion to its own system of planets, is so far removed from some of them, as to deprive them almost entirely of these benefits. And yet this must necessarily be the result of the present theory of the solar system.

19. In order to fix the places of the planets, we must look for a law in nature which will enable us unerringly to dis-

cover their several distances from the sun. It is natural to suppose, that centrifugal force will carry the larger planets further from the sun than the smaller, and that that force is in proportion to the bulk of the planet. We shall then, take the diameter of each planet, and for every thousand miles it is in diameter allow three millions of miles ; and for every hundred &c. in the same proportion, for the centrifugal force, to carry the planet from the sun, after the first projection of impulsion from the solar rays.

20. We shall suppose the ecliptic to be the real path of the sun through the heavens, being in circumference about five hundred and seventy millions of miles ; and we shall commence with the planets *within* the sun's course. First, the planet Mercury being the smallest, and therefore the nearest to the sun. The diameter of Mercury, is $3,150 \times 3,000 = 9,450,000$ miles, the centrifugal force then, carries this planet above nine millions of miles further from the sun than at its first projection, which we shall take to be twenty-eight millions of miles—this number appearing to agree most nearly in the case of all the planets. Add twenty-eight millions, and nine millions of miles, and it gives the

distance of Mercury from the sun to be, as it is computed, thirty-seven millions of miles. We shall next take the planet Mars, being next in size *within* the sun's orbit. The diameter of Mars is $4,093 \times 3,000 = 12,279,000$ miles, to which add the first projection, twenty-eight millions of miles; which gives above forty millions of miles distance for the *orbit* of Mars from the sun's orbit. But Mars' *place* in its orbit being the most distant from the sun, there is besides the entire diameter of its orbit between it and the sun, which makes it, as it is computed to be, one hundred and forty-five millions of miles from the sun. As the planets preserve the same places in their orbits with regard to the sun for thousands of years, with very little variation.

It will be necessary here to remark, that the earth and the planet Venus, having nearly the same diameter, it follows, that these planets are carried to nearly an equal distance from the sun, although their *places* in their orbits cause them to be twenty-seven millions of miles from each other. But a time may come, when they may approach the nearest points in their orbits to each other, when there would not be a much greater distance between them than there is between the earth and the moon; or about three hundred

and seventy-five thousand miles. We shall first take the diameter of Venus ; it being less than that of the earth. The diameter of the planet Venus is $7,718 \times 3,000 = 23,154,000$ miles ; to which add the first projection, twenty eight millions of miles—the distance, therefore, of Venus' orbit from that of the sun's, is fifty-one millions of miles. But her place in her orbit, removes her seventeen millions of miles further from the sun ; so that the actual distance of this planet from the sun, is sixty-eight millions of miles, as computed.

We shall next take the earth, being the last *within* the the orbit of the sun. Recollecting what has just been stated respecting its diameter being nearly that of the planet Venus, the centrifugal force carrying it, therefore, to but a little distance further from the Sun, *than* that planet. The diameter of the earth is $7,924 \times 3000 = 23,772,000$ miles—its orbit, therefore, when we add the first projection, is from the sun's, fifty-one millions of miles, but as the earth is removed to nearly forty-six millions of miles further in its orbit, the actual distance of the earth from the sun, is above ninety-five millions of miles. Now when we add the distance of the earth's orbit from the sun's orbit, on either side, thus, $51 \times 2 = 102$ it *being* one hundred and two millions of miles, it follows, that

the diameter of the earth's orbit, must be at least eighty eight millions of miles, which makes one hundred and ninety millions of miles for the ecliptic—or sun's orbit—which it is computed to be. Although the distance of Mars from the earth, is fifty millions of miles, yet their *orbits* are at a considerably less distance from each other's, their *places* in their orbits increasing the actual distance of the one from the other.

21. Leaving the planets which are within the sun's orbit, we shall next compute the distances of those outside the ecliptic—or sun's course. According to this theory, the new planets, being the smallest, must come nearest to the sun. They are then situated at an average distance from the sun of fifty-five millions of miles, and from Jupiter of two hundred millions of miles, moving at no great distance from each other. The planet Uranus, as it is computed to be the smallest of the outer planets, we shall take next ; its diameter being $34,292 \times 3,000 = 102,876,000$ miles, the distance then, —when we add the first projection, twenty-eight millions of miles—of its orbit from that of the sun's, is one hundred and thirty millions of miles.

22. In supposing the orbit of Uranus, to be within that of Jupiter's, there seems to be no difficulty, inasmuch, as this planet has given the greatest trouble to astronomers, for it is never to be found in its computed place ! simply because they have imagined its orbit to be *beyond* the orbit of Saturn, and according to a *supposed law*, at double the distance that Saturn is from Jupiter ; consequently this most unmanageable of all the planets, is never to be found where it is computed it should be, in the immense orbit given to it of not less than three thousand six hundred millions of miles in diameter, and therefore, eleven thousand millions of miles in circumference. The planet Neptune is computed to be in diameter $42,000 \times 3,000 = 126,000,000$ miles, the distance, therefore—adding the first projection of its orbit from the sun's—is one hundred and fifty-four millions of miles. The diameter of Jupiter is $85,968 \times 3,000 = 257,904,000$ miles, adding the first projection, the distance of its orbit from the sun's, is two hundred and eighty-five millions of miles, which makes this planet to be about—as computed—four hundred millions of miles from the earth ; when we take into consideration the distance of the earth *within* the sun's course, and the relative position of the earth and Jupiter in their orbits, thus $285,000,000 +$

95,000,000 = 380,000,000, their places in their orbits making up the rest. The diameter of Saturn is seventy-nine thousand and thirteen miles, but taking the diameter of planet and rings together, estimated to be two hundred thousand miles, —making the distance of Saturn's orbit from the sun's— $200,000 \times 3,000 = 600,000,000$ miles—when we add the first projection—to be about six hundred and twenty-eight millions of miles; and when we add the earth's distance from the sun, about one hundred millions of miles, and take into consideration their positions in their orbits, together with a part of the diameter of the earth's orbit—its distance from the earth will be about what it is computed to be, eight millions of miles—being according to this theory, the *most distant* of the planets—the diameter of its orbit being one thousand four hundred and forty-six millions of miles, and the circumference about four thousand three hundred and thirty-eight millions of miles. All these orbits are circular, and only having the *appearance* of being elliptical from the *sun also moving in an orbit*, so that the sun is nearer to the planets at one time than at another. Now, should we take the computed distances of the planets from the earth in the central orbit, we should find that it would place the planet Mars precisely as

this theory does, that is, within the Sun's course. In supposing the ecliptic to be the real course of the sun, it follows, as before remarked, that the outer planets are nearer to the sun than they are calculated to be; however we cannot place any reliance on the distances of the planets—as calculated or computed by Astronomers—from the sun, because the earth's distance was taken for the unit. For instance the earth is one hundred millions of miles from the sun, and Jupiter is four hundred millions of miles from the earth, *therefore, it is supposed*, that Jupiter is five hundred millions of miles from the sun, and so of all the planets; but we may place more dependance on the accuracy of the computed distances of the several planets from the earth, although as regards the *actual* distances of the *orbits* of the planets from each other, it may not be correct.

23. In placing the planet Mercury nearest to the Sun, and beyond the orbit of Mars, it must be shewn how it is, that the planet Mars never comes between Venus and Mercury. It is for this reason,—because of the difference of their periodic times—the planets, with very little variation, keeping the same position in their orbits. For instance

Mercury and Venus never depart many degrees from the sun on either side. Both these planets are seen in the morning—Mercury west, and Venus east of the sun—ushering in the dawn of day ; and likewise in the evening, at another time Mercury east and Venus west of the sun. So that these planets appear to describe their circles, in nearly the same time with the sun in his diurnal orbit, departing only a little to the one side or the other ; for which reason Mercury and Venus never come to our meridian like the other planets ; consequently they are never seen in the east, when the sun is in the west, as the rest of the planets which may be seen in opposite quarters of the heavens from the sun. And none of them appear in the form of a crescent or half moon, like Mercury and Venus, *except Mars*, which sometimes appears with a gibbous phase ; a *proof*, that his orbit is, as above stated, between the sun and the earth ; but, as this planet is placed in its orbit, owing to the difference of its periodic time, at a greater distance from the sun—that is, it does not follow with the sun like Mercury and Venus ; it therefore does not occur so often, as in the case of these planets which appear to describe their circles in nearly the same time with the sun, coming round each successive day to

nearly the same point, and for a considerable time of the year are lost in the effulgence of the sun's rays, running along with him in his orbit, which gave the idea that these planets moved round the sun. So that whilst they were invisible they were supposed to be pursuing their course at the other side of the sun, only because they could not be seen, being immersed in the sun's rays, day after day, for a considerable time.

24. It was from observing these planets, Mercury and Venus, always to accompany the sun, and that they never receded far from him, that suggested to the mind of Copernicus the idea, that the sun was *at rest* in the centre of the system, and that the planets revolved round him in elliptical orbits. But if this were so, why does the sun never occupy the centre? would he not equally attract the planets on every side, so that the orbits would not have the appearance of being elliptical, the sun occupying the foci of the ellipse; *which appearance arises from the sun moving in an orbit.*

25. The present places of the planets in their orbits may, *however*, after thousands of years be totally changed. It is

even now observed that the earth is removing farther and farther from the sun, that is, it does not follow so closely with the sun as Mercury and Venus do. But when it has reached the farthest point in its orbit, a *reverse* takes place, and it will then approach nearer and nearer to that place in its orbit, nearest to the sun, and move more in unison with him ; so that it may become altogether a warmer globe at all seasons of the year than it now is.

26. This has been observed, but no reason has been assigned, why it is so. The reason is obvious, since the sun also is moving in an orbit, and their times varying gradually brings about the change. For instance, suppose the sun and earth to be at the greatest possible distance from each other in their orbits, so that when the sun is in the east in his orbit, the earth is in the west in its orbit. But suppose after many revolutions they should approach nearer and nearer, so that after thousands of years, it may be, there should not be the whole diameter of the earth's orbit between them, but only the distance of their respective orbits—and those of intervening planets, asunder ; and that at every revolution this should continue for centuries without greatly

changing or varying ; the earth would in this case be a warmer globe at all seasons of the year, until gradually the reverse takes place, when the earth would become a colder globe.

27. Perhaps this has actually taken place ; if so there could have been at that period only *one* frozen region upon the earth, which must have been the centre of the opposite side of the globe from the sun. *There*, the sun would never be seen to rise, and there would be only twilight to relieve the darkness of the winter season. This would satisfactorily account for one half of the earth being nearly all water to the present time. From the western coast of America, round to the eastern and southern coasts of Asia and Africa, there is very little land ; and if we suppose these great seas with their ocean rivers, to have been frozen for ages together, the breaking up of them, would most certainly cause a flood over the whole earth in a greater or less degree, and for a longer or shorter continuance, and might have been the occasion of the flood, in the days of Noah, when we are told, "the fountains of the great deep were *broken up*." Such an occurrence would also account for large round blocks of stone

called boulder stones, lying on the surface of the earth, in some places, which from their appearance must have rolled in the waters for ages, and been transported from a distance, as they are found to differ in composition from the rocks in their vicinity. But such changes upon the earth can only be brought about in vast periods of time, and arise from the difference of the periodic times of the earth and sun, moving in orbits.

28. It may here be remarked, that the earth's *diurnal* time, does not appear to be very different from the sun's, in his orbit, from the fact, that when the longest day occurs in the summer solstice, the sun and earth seem to arrive at nearly the same point in their respective orbits, for some days, in describing their diurnal or daily circuit. That is, the sun arrives in the east in his orbit, and the earth arrives in the west in its orbit, at nearly the same time, but the sun and earth moving contrary ways, as will just now be explained; and thus the change is brought about by very slow degrees, to the shortest day in the winter solstice; it being six months, from the longest to the shortest day.

29. In winter the earth is three millions of miles nearer

to the sun, than in summer ; but the sun's rays, fall obliquely upon it, and therefore, it does not derive the same heat, as in summer, although the sun is more distant then ; thus during the winter, the earth arrives each day at a point in its orbit nearer to the sun's course, brought about by the earth and sun moving contrary ways in their orbits, together with the difference of their periodic times.

30. The length of day and night, doubtless varies in the several planets ; perhaps some of them may have days four times the length of ours, or even longer ; suited to the inhabitants of those worlds, who may be "greater in power and might," than man, who inhabits this comparatively small globe.

31. We have already supposed the earth to be in opposition—or *nearly* so—to the sun, coming round each day to the east in his orbit, and the earth arriving in the west in its orbit, so that the sun and earth are going *contrary ways* in their orbits, *although the motion of both is from east to west* ; thus the sun is proceeding north east, when the earth is *returning* south west in its orbit—it is then sun rise ; but

when the sun has proceeded to the south, and the earth has moved to the north, it is then noon to that portion of the earth which is opposite ; and when the sun is in the west in his orbit, and the earth is in the east in its orbit, it is then sun set ; and when the earth is in the south, and the sun is in the north, it is then night ; and so on alternately to the different parts of the earth, the days being longer to that hemisphere which is opposite to the sun's course, and shorter to the other hemisphere, *the pole of which is averted from the sun*, alternately to the northern and southern hemispheres, for six months of the year, according as the poles are to and from the sun ; which also occasions the variety of the seasons—the north pole being for half the year towards the sun, and the southern pole during the other half year—the earth and sun changing places, from the northern to the southern portion of their respective orbits every six months—the earth coming round day by day, moving from east to west, to the northern half of its orbit during six months, and to the southern half for six months more. For instance when the earth is in the southern half of its orbit, and the sun is in the northern half of its orbit, each coming round day by day ; the north pole of the earth being towards the

sun's course is then enlightened, and it is its summer. But in six months more, when by the earth's and sun's *difference of times* in their orbits—which also occasions the precession of the equinoxes—a reverse takes place, and the earth comes to the northern half of its orbit, whilst the sun arrives in the southern half of its orbit; the south pole is then opposite to the sun, and enlightened, coming round successively each day, and it is then summer to it, while the north pole is in darkness, being *averted* in its orbit *continually* from the sun's course, the sun and earth moving different ways in their orbits, although as before stated, the motion of both is from east to west; so that the sun is never seen to rise for six months together, to that pole which is thus averted from the sun, or to rise to so great a height above the horizon in winter, to that hemisphere, as he does in summer, when the pole is towards the sun; thus summer and winter succeed each other to the northern and southern hemispheres, so that the earth would appear to have two summers, as it is supposed the planet Venus has.

32. It is quite evident, that if the earth turned upon its axis, as it is imagined to do, every twenty-four hours, that

no portion of the earth COULD BE *in darkness for six months together*. The earth being nearly a sphere, the axis or polar diameter, being but twenty-six miles shorter than the equatorial diameter, and although the *line of light* might not coincide with the *earth's axis*, yet if the earth turned upon an axis of rotation every twenty-four hours, *whatever the line of light might be*, it is *evident* that every part of the globe of the earth would be presented to the sun in succession, and there would be equal day and night; for one half of the globe would be enlightened each day, whilst the other half would be in darkness, and this during the whole year, consequently there could be *no variety of the seasons*.

33. When we consider the *magnitude* of the sun as compared with the earth, his diameter being one hundred and eleven times greater, being about a million of times larger than the earth, it is impossible that this should not be the case. If the earth turned upon its axis, it would therefore be exposed alternately every twelve hours to a burning sun. In such a case there could not possibly exist upon it either man or animal, constituted as they are at present; and without vegetation or water, or even an atmosphere, the

earth would be still more unfit for the support of animal life, than the moon is supposed to be, for she is exposed every fortnight to a scorching sun, whereas if the earth turned upon its axis, it would be so every twelve hours alternately.

34. The earth appearing to move through the signs of the Zodiac from west to east, is the time lost by the earth, as compared with the constellations circulating in like manner as the sun ; which will presently be explained with regard to the moon's loss of time with the earth in its orbit, which amounts to three hundred and sixty-five days—the length of our year— before the earth and same stars are in the same position again. In like manner the progress of the sun in the heavens is computed to be nearly a degree each day ; and a degree being the three hundred and sixtieth part of a circle, the sun would exactly describe this in a year, or three hundred and sixty-five days.

35. But we have yet to consider how it is that the stars are disposed of in groups or constellations, to which names have been given from the remotest antiquity. Some of the

constellations are mentioned in the book of Job, and bear the same names to this day, although it has never been discovered by whom they have been so called, but probably from the days of Adam, who might have had the knowledge directly imparted, by Him "who calleth the stars by their names." Or it may be, when Adam had named all the animals, "which the Lord God brought unto him," that afterwards he might have so classed the stars, as they appeared to bear any resemblance to the figures of man or animals; however that may be, it is probable no better plan can be devised.

36. The stars and constellations appear to be arranged in "stories," as the Scriptures call it, in Amos, ix. 6.; or as we say, in spheres, one above another, where they move without approaching the other story or sphere. But let us consider how the binary or double stars and constellations may be bound together, pursuing their course in orbits, without changing their figure, or parting company. Suppose these enormous stars or suns moving with immense velocity, coming within the influence of each other's rapid motion—once caught—they would become united in each others

whirl or motion, and pursue their course inseparably; unalterable in their figure, and taking a regular course together.

37. Nothing has more perplexed astronomers, than those stars which are supposed to have disappeared, never to return, and others which have unexpectedly appeared; but if the stars move in orbits, there is nothing in this to alarm or terrify. Suppose these stars to move further and further off in their immense orbits, until entirely out of sight; and others which have been invisible for centuries, or thousands of years, to come again in view whilst pursuing a small portion of their course; there is nothing extraordinary in this, it is just what might be supposed to be the consequence of orbital motion in the stars. For instance, our sun is supposed to be placed in one of the nebula or starry systems, not in the centre, but rather towards the side; now the sun moving in an orbit must have a *set place* in this assemblage of stars; some may circulate round him, above him, and beneath him; but others there are, the orbits of which are situated *far beyond the sun's place* in the starry system, these may circulate thousands of years without coming in *view* to an inhabitant of the earth, and then only for a short

time, whilst pursuing that portion of their orbit *nearest* to the sun's place ; thus, some stars appear, and others disappear, but still are pursuing a regular course.

38. A moment's consideration will show how absurd it is to suppose, that "the sun is making an extensive circuit of the heavens, with all his planets following," as it is imagined, now that motion has been discovered in the sun. But if this were so, the whole system of stars to which the sun belongs, would thus be disarranged. There may be indeed a general drifting of the entire system through space, but the stars and sun moving in orbits, must have their allotted places, in such a congregated system of stars.

39. How beautifully does David in the nineteenth Psalm describe the course of the sun, although astronomers hitherto have carefully avoided quoting this portion of the psalm ; there is something in it antagonistic to their theory of a *quiescent sun* ? perhaps now that they have discovered by their own ingenuity, what the Scriptures informed them of long before, they will not have such an objection to this inspired passage—"In the heavens hath he set a tabernacle,

—or habitation or place—for the sun, which is as a bridegroom coming out of his chamber—decked with the glorious apparel of light—and rejoiceth as a strong man to run his course. His going forth is from the end of heaven—the visible heavens—and his circuit unto the end of it again, and there is nothing hid from the heat thereof. The law—or doctrine—of the Lord is perfect, converting—or restoring to—the soul—or understanding that which was lost—the *testimony* of the Lord is *sure*, making wise the simple.” Psalm, xix. 5. 6. 7. These truths have been *lost* in what may be called—notwithstanding many brilliant discoveries—the “dark ages” of astronomy. It is true the Scriptures were written to teach men religion, and not science, but where such matters are touched upon, ever so slightly, there can be *there* no scientific error. In the inspired Word there are treasures of knowledge hidden from “the wise and prudent,” which they little dream of, and which none can find, but those who dive deep for them.

40. Were the spirit of inspiration only given when Moses, and the Prophets, and Apostles, wrote on religious subjects, and withdrawn where any scientific matter was alluded to,

the Bible would be full of absurdities, whereas nothing of the sort is found in it ; on the contrary, as science advances we find more and more, that the *Bible is right on these points.*

41. It was but the other day when it was believed, the sun was *at rest* in the heavens, and the stars *fixed*, although the Scriptures tell us, "The morning stars sang together," thus beautifully describing the unison of their motion together ; and that the "sun rejoiceth as a giant to run his course." But man, vain man, rejected the testimony of Scripture, until forced to acknowledge the truth of these facts, from his own discoveries. Scientific men may rest assured, that when they and the Bible are at variance, that the Bible is right, and they are wrong. They may indeed *misunderstand* passages of Scripture, and it may cost them some labor to ascertain the true meaning ; but in the result, their labors will be amply rewarded. Even that passage in Joshua, where it is recorded the "sun stood still in the midst of heaven, and hasted not to go down about a whole day," conveys to us *what probably would never otherwise* enter the head of any one, that the sun is the *source of*

motion to his own planets ; for when the sun was commanded to stand still over Gibeon, so did the moon, where it appeared "in the valley of Ajalon ;" so that here we have the sun, the moon, and the earth standing still, until a great battle was decided, for "the battle was the Lord's." Perhaps that event concerned all surrounding worlds, and was understood in those planets. We should remember the controversy is between God and Satan in this world, and that God has chosen out of it, a people for himself, and "a land" which He calls his own ; an earnest to us, that one day "the kingdoms of this world, will become the kingdoms of our Lord and his Christ," and that "Satan will be cast out." This passage in Joshua, is not the only one in the Scriptures which records, that the sun stood still upon that particular day, it is mentioned in Habakkuk, iii. 2., and besides in the Apocrypha Eccclus. xlv. 4. and we are told it was also "written in the book of Jasher," as if to assure us of the fact, (see Joshua, x. 13.) There is also a tradition of it in countries where the Bible is not known.

42. Some persons there are who will tell us, the Scriptures do not mean that the sun was *actually* stayed in his

course, but merely that the day referred to was particularly bright, and continued so to the end, so that it might be said to be twice the length of the usual day; now this is not what the Scriptures state, and they are very explicit on this point. "The sun and the moon stood still in their habitation," and again, "The sun stood still in the midst of heaven, and hasted not to go down, about a whole day, and there was no day like that, before it or after it." The sun therefore *was* arrested in his course, and although it was a miracle, for a special purpose, yet we know that the Almighty usually makes use of means, to bring about his purposes; perhaps in this case not altogether beyond our comprehension.

43. We shall briefly state a case imagined by the astronomer Herschel, which may throw some light upon this subject, in regard to the treble stars. He supposes, "two equal stars moving in circular orbits round their common centre of gravity, which will be the centre of the circle." He then supposes a third star to descend, with a gradually accelerated motion, till it reaches the centre of gravity, and passing onwards with a motion gradually retarded, it will

move to the other end of the perpendicular, when it will arrive at *a state of rest*, afterwards oscillating between these two points." We can easily imagine in like manner, the sun coming within the influence of stars moving in orbits, to be caught in their motion, so as completely to arrest him in his own proper course, so that at length he either takes that of the other stars, or breaking from them, pursues his own original course. It is probable, that it is this way the stars are bound together, in treble and multiple stars, and thus the collision of enormous bodies in the heavens is provided against, which would be inevitable, should they rush along in their original courses. But to continue, "did not the sun go back by His means, and was not one day as long as two?" Ecclus. xvi. 4. That this event took place we cannot doubt. But who can estimate the changes it may have occasioned upon the earth ! perhaps since that period, now more than three thousand years ago, the earth may have become altogether a colder globe, being on that very day removed further from the sun, whilst he broke forth on a new career.

44. How endless might be the speculations of the chron-

ologist, on this subject. Perhaps the length of the year was then changed, and became longer, from the sun taking a more extensive course ; and also the moon's period. It would even account for the tradition among the Egyptians, that there was a time when there was *no moon*. On that day the moon might have been so displaced, as to get almost beyond the influence of the earth's whirl of atmosphere, which kept it circulating round it—and *which is the only attraction* can be exercised by one body upon another in the heavens—so as for a time to be invisible to certain parts of the earth. But we have no authentic history reaching back to this period, by many hundred years ; and the Bible does not inform us on these points.

45. We shall now consider, whether the moon does not make a revolution in her orbit from *east to west*, every twenty-four hours, as she appears to do, and not as it is supposed, requiring a month, or from one new moon to another, and appearing to reach the stars from which she set out. from west to east. This it will be shewn, is the time she *loses* each night in completing her circle. The first moon of Jupiter, is only one of our days and eighteen hours

going round that planet, although so much larger than the earth ; and it is probable that the moons of Jupiter, do not appear to the inhabitants of that planet, to change with the rapidity which is imagined, but gradually to Jupiter, like the earth's moon to its inhabitants; as the phases are brought about by the backward motion, or *loss of time*, to the different parts of the earth.

46. It is a remarkable fact, that on account of the supposed motion of the moon, Sir Isaac Newton considered his theory of gravitation a failure ; and he died, believing it so, although his theory has been adopted, and we are assured that his calculations were wrong, which however, we shall take leave to doubt. The moon then, was a "stone of stumbling" to that great man, nor would he impose upon the world, what *he did not believe* to be proved.

47. The motion then of the moon *is not understood*. Let us see how it is, that astronomers have fallen into the error of supposing the moon requires a month to describe her orbit; simply by *not recognizing* the motion of the heavenly bodies to be from *east to west*, and not as they suppose, from *west to east*; in this lies all the error.

48. Let us now suppose the moon to move from *east* to *west*, in her orbit, every twenty-four hours, along with the earth in its orbit, daily. But from the earth's progressing in its orbit, the moon is left behind, and is consequently half an hour later every evening, in arriving at the same point, as the evening before; this gives the *apparent slow motion* from west to east, and is *the only motion recognized by astronomers*. By this motion, or rather *loss of time*, it is, that the moon becomes alternately visible, to the different parts of the earth, her different phases being occasioned by her position in her orbit, with regard to the sun moving in a diurnal orbit.

49. As the moon always keeps the same hemisphere towards the *centre of her orbit*, we sometimes see a little of the other hemisphere of the moon, both in longitude and latitude, according to her position with regard to the earth moving in its orbit; and as the earth also moves with one hemisphere always towards the centre of *its* orbit, it is evident that it is by the moon's loss of time with the earth, that she becomes visible to all parts of the earth, in the course of the the month.

50. The rate of the moon's motion cannot be computed from eclipses ; when an eclipse of the moon takes place, the moon having by this backward motion, or loss of time, come in opposition, the earth coming between, and proceeding in its orbit along with the moon in her orbit ; but the earth moving faster than the moon, occasions the earth's shadow to pass over the moon, commencing on the *eastern* side, and going off on the western side of the moon. But the sun moving in his orbit the *contrary way* from the earth, occasions the eclipse to be sooner over than it otherwise would.

51. When an eclipse of the sun occurs, the sun, moon, and earth being in a line, and the moon *at that time* moving *with* the sun, and the earth moving the contrary way from the sun ; it is the moon's loss of time with the sun, which occasions an eclipse of the sun ; on the contrary, to *commence* on the *western* side of the sun, and going off on the eastern side, which gives the *appearance* of the moon moving from west to east. The earth and sun moving contrary ways, also occasions the eclipse of the sun to be sooner over.

52. If then the velocity of the moon in her orbit is such

as to complete her circuit every twenty-four hours, it is evident that all calculations which have been made with respect to the comparative weight of planets, must be erroneous. As it is supposed the weight of bodies in the heavens, may be known by the attraction they exert upon bodies placed at equal distances from them ; the rate of the moon's motion being an index to the quantity of gravitating matter composing the earth, and so of all the planets.

53. Thus under the present theory, Jupiter, though so many times larger than the earth, is made to be of no greater weight, than a body of the same dimensions of some light wood ; whilst the planet Mercury, which is so much smaller than the earth, is imagined to be of twice the density of the earth, or nearly equal to a globe of the same dimensions of lead ; but of late this is considered to be an error, and the planet Mercury is now supposed to be about half this density—calculated from the amount of its disturbing effect upon a comet passing near its orbit ; these disturbances being supposed to be in proportion to the disturbing mass.

54. Such is the result of calculating from the slow motion given to the moon, and from Astronomers not having attained to any *just ideas* of the velocity of motion in the heavenly bodies.

55. It cannot be, that the moon requires a month to complete a circle round the earth ; let us rather suppose, that she completes her course as she appears to do, every twenty-four hours ; and that her different phases are occasioned by her position in her orbit, with regard to the sun moving also in a diurnal orbit. But the moon must make many revolutions round the earth, before she is in conjunction with the sun, from one new moon to another ; *this* occurs but once in a month, nevertheless the moon has made twenty-nine and a half revolutions round the earth in that time, and has never been in the same point of the heavens during that period with the sun. Likewise the moon must make many revolutions round the earth, before she comes in opposition when it is full moon.

56. At the periods when the eclipses of the moons of Jupiter have taken place, some difference of times has been

observed, when that planet is nearer to the earth than when more distant; which can easily be accounted for by the motion of the sun in an orbit; but without a knowledge of the sun's motion, it could not be understood. To account for it, the theory of the "travelling of light" was first introduced, which suited the difficulty so well, that a great astronomer said, "if it was not true, it deserved to be so." But there is no need of this theory, the sun moves—the source of light to all satellites and planets.

57 The cause of the difference of sixteen minutes and a half, between the times of the eclipses of the moons of Jupiter, when that planet is nearer to the earth than when more distant, in part is, that Jupiter is at that time *not only* nearer to the earth, and moving the same way with the earth—and it is well known the nearer a body casting a shadow is, the larger will the shadow appear—but also is in a more direct line with the sun, and consequently casts a broader shadow; this is brought about by the sun moving in an orbit, as well as the planet. The breadth of the shadow therefore being greater, the moons are sooner involved in it than if the shadow was smaller, in which case

the moons would not be eclipsed until they had arrived at a different position ; so that it is the travelling of the *satellites*, and not the travelling of *light*, which causes the difference of the times of the eclipses ; the moons of Jupiter also losing time—as has been explained with regard to the earth's moon—in the contrary direction from that in which the planet is making its rapid progress in its orbit, thus leaving the satellites behind ; this gives to the moons the *appearance* of moving from west to east, when in reality their motion is from east to west. But the principal reason of the moons of Jupiter being eclipsed sometimes sooner, and sometimes later, and on some occasions not at all, is owing to the position of the planet with regard to the *sun moving in an orbit*, and the consequent direction in which the shadow is cast, so that on some occasions the moons escape the shadow of Jupiter altogether, according to the direction in which it is cast.

58. There is then no need of the theory of the travelling of light. The eye was made to see at any distance, provided the object does not become too minute to be discernible. *We might as well suppose the black spots which we perceive*

upon the sun's disc travel to us, or that the planet Mercury travels to us, when it transits the sun like a dark spot, for we can perceive it ; as to suppose the light of each star requires millions of years to reach the earth—no ; we see the stars where they are. It is quite wonderful how this theory could have engaged the attention of some of the greatest astronomers, so contrary as it is to experience, and therefore incapable of proof.

59. For instance, suppose a light placed in a window upon a dark night ; it illuminates to a *certain distance* in proportion to the *size* of that *light*, be it a lamp or a taper ; nor will *any time* make it extend one whit further than when first lighted. Beyond that gleam of light you are in utter darkness, nor can you discern the nearest object ; but *still* you can perceive the *light itself* in that window, diminishing indeed as you depart further and further from it, until at last it becomes too minute to be discernible.

60. So it is with the light of each star ; we see them *where they are*, and some there doubtless are, whose ray of light never reached this earth, nor never will. *No time*

will make it travel, yet we see the *star itself*, although diminished from its enormous distance to a mere speck. Other stars are altogether invisible to the naked eye, which with a telescope we can distinctly perceive. Now we know that a telescope *cannot bring the light* of the stars to the earth, but by *magnifying* them it makes them appear nearer, so that we can see a star, *the light of which does not reach the earth*. We must remember that all light has the same origin, and arises from combustion, or combination of gases, consequently its nature is the same, whether it proceed from the sun, a star, or from the flame of a candle, or any other body of light, and it is quite evident, that *reflected light can still less* be supposed to travel. It is necessary therefore to account in some other way, for the difference of the times in the eclipses of the moons of Jupiter.

61. We shall now consider whether comets cross the orbits of the planets—as stated by astronomers—or whether they are pursuing their course with the same regularity as the planets, although coming in view but for a short time, and during a small part of their circuit. The number of *comets* belonging to the solar system is supposed to be very

great—imagined not to be less than three thousand ; and it has been apprehended by some, that a comet, in crossing the earth's orbit, might happen to come in collision with the earth). But *do* the comets cross the earth's orbit, or the orbits of any of the planets ! may not the idea, that the comets sweep forth *from all directions* towards the sun, have arisen from the idea, that the sun is in the *centre* of the system, and perceiving that they circulate round him.

62. It would indeed be a terrific consideration, if these three thousand comets were liable to cross the earth's orbit, as they are described, “plunging downwards to the sun, and coming up from below the plane of the ecliptic, sweeping swiftly round the sun, and then with incredible velocity winging their flight indifferently with, or opposed to, the general motion of the planets.”

63. This is a very important subject, it concerns the very existence of the globe which we inhabit ; but may not the appearance be occasioned by the very error here combated, of supposing the sun to be in the *centre* of the planetary system, instead of moving in an orbit ; and from ob-

serving that the orbits of comets *always incline to the ecl* which we are supposing to be the *real* path of the Beyond the orbit of Jupiter no comets have been *seen*, v tends very much to confirm the opinion, that the ecl alone the path of the comets, and that they circulate r the sun, but only coming in view in particular parts of orbits. Thus, a comet arrives—day after day—at n the same point, visible to us for a certain period; after v by its loss of time or backward motion—as explained regard to the moon—it *again* becomes invisible, and not arrive within view for years, but is nevertheless pur a regular course, endangering neither earth or planet circuit.

64. The assertion that the orbits of comets are parab is a mere supposition, and incapable of proof, in conseq of comets describing so small a part of their course v our view, so that it *never could* be ascertained that s the form of their orbits. This is admitted by astronc and as more attention is being given of late to the astrc of comets, we may hope that this *very erroneous* idea, i long will be given up. *Already forty comets have be*

certained to revolve in elliptical orbits as the planets appear to do, which appearance is occasioned—as has been already explained—by the sun also moving in an orbit.

65. Many have been the opinions respecting the *nature* of comets ; it appears that they are in general solid, opaque bodies, from which a stream of luminous matter diverges. This seems evident, for when they transit the sun, they appear round and black like the planets Mercury and Venus, under the same circumstances.

66. Of their *origin* nothing seems to be known ; but it is highly probable they are shot out from the sun—although we cannot understand by what process this is accomplished, in that wonderful and enormous globe—for if comets do not enter the solar system from *unknown regions*, what other origin can we suppose them to have—and that by circulating round the sun, they are the sole source of solar light and heat, being constantly replaced, as some *cool down*, and become the foundation of worlds yet to be ! which are still forced further and further from the sun, by the new comets. The ecliptic or real course of the sun, is then alone

the path of the comets, circulating round him, and at the same time moving with him in his orbit; so that comets may be called the *satellites of the sun*.

67. When a telescope is directed to the stars—which are supposed to be SUNS—it shows them only as so many luminous spots, without any well defined diameter. Now although the stars are *vastly* more distant than the planets, yet should not a telescope of great power, magnify in the same proportion, and present to the eye enormous discs, if such they had. But whatever the diameter of the disc may be, it is *evident* it is small, when compared with the luminous atmosphere with which a star is surrounded; so that *their* atmosphere is probably lighted up by an assemblage of comets, as we have described the SUN'S TO BE.

98. This seems to agree with the term used in the first chapter of Genesis, *of the two great lights*, or “light bearers”—as the word in the original is said strictly to mean—which God made on the fourth day, or age of creation.* So that

* The first and second chapters of the book of Genesis, appear to have a two-fold meaning. The first, or simple reading, referring to a

although the sun was probably created at the same time as the earth, it was not until the fourth day that he was made to burst forth as a great light in the heavens, and that the moon shone as "the faithful witness in heaven" of that light. *Then* it was, that "the morning stars sang together, and all the sons of God shouted for joy." So beautiful and excellent was the scene, even in the sight of the highest of created beings.

time when the earth was submerged in water—probably from the breaking up, and melting, of previously frozen regions, caused by a change in the earth's position with regard to the sun, as well as a change of the *different regions* of the earth's surface with regard to the sun: and brought about—as has been already explained—by the periodic times of the earth and sun in their orbits, varying. After which, the Almighty renewed the face of nature in literally six days, and the present arrangement, and order of creation, took place "by that working, whereby He is able even to subdue all things unto himself." Phil. iii. 21. On the fourth day the sun and moon became visible, which were before obscured by mist, and thick clouds.

But the second chapter seems to intimate, under the veil of the first sense, a *fuller meaning* to all that is related in the first chapter: and the *whole six days* are spoken of as *one day*, in which the heavens and the earth were *finished* and all the *host of them*. In the fourth verse we are informed, that "these are the generations," or in other words, the his-

69. The sun *may* be a dark body, as we know the moon to be ; but these luminous bodies shot out from the sun, and circulating round him, give to the sun the luminous atmosphere which we behold ; thus, the sun is a "light bearer," and the moon reflects that light, and so is a bearer of light to the earth.

70. The appearance of the sun when viewed through a telescope, greatly confirms this opinion ; for the sun no longer

tory of originals, implying a progressive course—which the word Genesis signifies—"of the *heavens* and the *earth* when they were *created*, in the *day* when the Lord God *made* the *earth* and *heavens*." And it was not until this fourth day, or age of creation, that the sun burst forth as a light in the heavens, to give light upon the earth and other planets. St. Paul says, "By faith we understand that the *worlds* were framed by the word of God, so that things which are seen, were not made of things which do appear." Hebrews, xi. 3. The apostle here speaks of the *creation* of the *earth*, and *heavenly bodies* : he does not say they were made from nothing, but that they were not made from such materials as they appear to be composed of.

We should remember that a *day*, is spoken of in Scripture, to express *no definite time* : for instance, "the day in the wilderness, was forty years," and it is said, "one day is with the Lord, as a thousand years, and a thousand years, as one day."

appears like a ball of liquid fire, but spots are distinctly discernible, which appear and disappear very rapidly, moving from *east* to *west* across the sun's disc, their period of revolution being twenty-five days and a half.

71. From imagining these spots to belong to the *body* of the sun, it was supposed he turned upon his axis in that period of time, but it appears *evident* they are *comets* circulating round the body of the sun; for these spots are surrounded with luminous matter, and in the spaces between are observed *curved streaks*, of *intensely luminous* matter; so that the solar disc is not uniformly bright, but has the appearance of an undulating ocean of liquid fire. Now this is exactly the appearance we might imagine to be produced by a number of comets circulating round the sun; in fact nothing can be more evident than that *so it is*. The comets of 1680, and 1843, approached so near to the sun, that they almost grazed his atmosphere, and their velocity was such, that if unabated, they would, it is said, have revolved round the sun in less than two minutes. In fact the appearances observed during the total eclipse of the sun, on the 28th of July, 1851, visible from different places in Sweden

and Denmark, seem to leave no doubt upon this subject. On this occasion there were observed prominences of the most brilliant lake color, and pink, quite defined, and which, there seemed no doubt, belonged to the sun, and not to the moon, as they appeared *detached* from the sun's limb, a strong white light intervening between the limb and the base of these prominences ; one of these spots was observed suspended in the light of the corona, or bright rays of the sun, with a long range of rose colored flames which had a flickering motion. Nothing can be more evident, than that these were comets circulating round the sun.

72. It has been found, that the very lengthened periods given for the return of some comets, is a mistake. In the case of one—the period of which was supposed to be one hundred and seventy-five years—it is now discovered, that this period comprises *eight returns* of the comet. Other comets are found to have shorter periods ; one was discovered in the year 1818, which returns every three and a half years, and goes by the name of Enckes' comet. Its motion is said to differ nothing from that of a planet, whose mean distance from the sun, is that of the nearest of the planetoids.

Although this comet seems to have been invisible until that year, still, it must *always* have made its revolutions with the same regularity ; and short as this period of three and a half years appears, it is probable that it is *merely the period* in which, by its *loss of time* with the sun, or its backward motion, it arrives, day after day, at a point in its orbit, in which *it becomes visible* to an inhabitant of the earth. The real period of this comet, or the time it requires to perform its circle round the sun, from east to west, may be only a very few days, or *more probable* still, a few hours ; so that a time may come, when it *may again become invisible*, from this loss of time carrying it beyond our vision. This has been already fully explained, but it cannot be too often impressed upon the recollection of astronomers, because unable to account for the *fact*, that the periodic time of this comet, undergoes a slow, gradual, and regular decrease, amounting to about a day in ten revolutions ; from which they erroneously infer, that the *magnitude* of its orbit is constantly decreasing ; and to account for it, the theory of—what is termed—a *resisting medium* has been resorted to. But that theory is unnecessary : there can be nothing to resist immense bodies moving in the heavens.

73. It is probable the like phenomenon will be discovered in all comets ; as yet however, it has not been ascertained with regard to any other. In the same way may the longer periods of comets be accounted for ; so that the same comet may oftentimes re-appear, but under such different circumstances, that to mistake it for two or three different comets, is by no means impossible.

74. The tail or nebulous part of a comet, is of such exceeding rarity, that in passing over a cluster of minute stars, it does not efface them ;—such is its extreme translucency, that they are perfectly visible through the cometic matter. As we have nothing on earth with which to compare it, we can form but little idea of its exact nature. To attempt an explanation under these circumstances, might seem to be presumptuous—and yet, a very remarkable appearance in the atmosphere, observed on one of those intensely hot days which we experienced for about a fortnight in the summer of 1856, might, perhaps, convey some idea of the nature of cometic matter, as well as that of light. A brief description must suffice ;—The writer, whilst sitting under the shade of a tree, on one of those hot days of almost tropical weather to

which we have referred, and facing the north-east, a powerful sunbeam passing over from the south—was surprised to perceive a number of small transparent globes, about a quarter of an inch in diameter, glittering in the sunbeam, and floating past from east to west, to the distance of three or four feet ; each set were about three seconds in passing, and the whole appearance continued for about two minutes, or until the sun had passed from the spot. They were of uncommon brilliancy, and reflected their light one upon the other ; but when many were close together, they seemed to lose their reflecting power, and did not shine at all. Their appearance was, as it were, small globes composed of the finest and clearest crystal, with a whitish semicircle on the upper part of each, which imparted a dazzling brightness.

75. A little later in the season something of the same kind became observable, and under similar circumstances ; but the state of the weather was then somewhat damp, in consequence of which, the little globes assumed a watery appearance, and were not bright. They were thinly scattered, and continued visible to a much greater distance than on the former occasion, moving about rapidly in every direction.

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76. The question then arises—*is this* the nature of light? Is this indeed, the nature of cometic matter? We *cannot doubt it*, and that it *will* be found to be the nature of *all* light—that emitted from the rays or flame of a fire, and the light proceeding from the flame of a taper, *only differing* in the *extreme minuteness* of the little globules of which it is composed; from which cause they elude the sight.

77. Perhaps the great dry fogs which spread themselves over a large portion of the surface of the earth, in the years 1783 and 1831, extending from Africa to Sweden, and prevailing on the north American continent, were of this nature, as they were supposed by some to be produced by the tail of a comet passing over a portion of the earth, and, therefore, to consist of cometic matter.

78. It is not improbable, that the earth is surrounded by such an atmosphere, above the atmosphere of air; this appears almost certain, when we consider the diffusiveness of light through the heavens. The fogs in question were distinguished by their absolute dryness; and it was said they possessed a faintly luminous quality; so that, in the total

absence of moonlight, the light proceeding from the fog was sufficient to render objects visible at the distance of two or three yards. In 1831, during the month the fog of that year prevailed, there was no darkness during the night, and there was light enough to read the smallest print or writing.

79. As no theory has, as yet, been suggested, for the satisfactory explanation of the Aurora Borealis, we shall here give a short description of this phenomenon ; and afterwards make a few remarks on what would seem to be the cause of those appearances.

80. The Aurora Borealis is a luminous phenomenon, which appears in the heavens, and is seen in high latitudes in both the northern and southern hemispheres. It is sometimes called "northern lights," because the opportunities of witnessing it are more frequent in the northern than in the southern latitude ; there being no land there, in a sufficiently high latitude, and besides it has been scarcely entered on account of its extreme cold.

81. The Aurora Borealis consists in luminous rays of light

which appear after sunset near the horizon, as a vague diffused light; like the faint streaks which preceed the rising of the sun, and form the dawn of day, and it is usually a white light. After the close of twilight it becomes more conspicuous, and there is a little more brightness towards the *west*, than in the other parts of the heavens. It then forms a luminous arc above the horizon; surrounded with a pale light, afterwards interspersed by rays of various colours and bright emanations, indicating a *movement* of the entire mass, which seems agitated by internal shocks; then luminous radiations issue from it, as of flames from a conflagration; after which it becomes more extended, but with diminished intensity—at times, however, exhibiting, sometimes on one side of the heavens, and sometimes on another, jets of light—the brightness of which, appear greatest near the horizon. The Aurora Borealis is more frequently visible from about the middle of November, to the latter end of January, *at which time the sun remains below the horizon*. It commences after the close of twilight, and all the appearances take place during the first half of the night; after which the Aurora seems to have lost its intensity, and the rays become more diffused, and a feeble light is spread over

the heavens. This phenomenon becomes gradually more faint on the appearance of twilight, and rarely continues after the commencement of day-break, when it disappears altogether.

82. In the absence of any theory to account for this phenomenon, we may be permitted to say, that it seems *so entirely connected* with the *sun* moving in a diurnal orbit, that we cannot hesitate to attribute the phenomenon of the Aurora Borealis, solely to the passing of the sun's rays obliquely, after it has set, between the icy regions and the clouds; just as a flash of lightning is observed to have a tendency to pass between the clouds and the water—these immense tracts of ice rejecting, as it were, the solar heat; or not absorbing it as the earth does—so that, the light and heat are thrown back into the heavens. And sometimes the rays of light thus repulsed, passing behind the clouds, no doubt charged with electricity, and affected by winds, and undergoing frequent changes in form and brightness, thus produce the phenomena of the Aurora Borealis.

83. Of a nature precisely similar, are the appearances ex-

hibited at a total eclipse of the sun : so much so, that a description of the one would almost answer for a description of the other. Thus when the total eclipse took place in the month of June, 1842—visible at Vienna, there appeared round the darkened sun an irregular halo of *whitish light*, extending in some places into long gleams, forming a faint glory : after which a red, lurid glow suddenly kindled up the horizon, which encreased, until it resembled a *mighty conflagration*—and *perpetual flashings* of light from behind the moon, from which the principal light came—and no longer from the sun. Now these appearances strikingly resemble the Aurora Borealis, only a total eclipse of the sun can last but four minutes : whereas the Aurora Borealis *continues*, whilst *the sun* is *below* the horizon in those icy regions. But this is disregarded by astronomers, because they do not admit that the sun and earth move in diurnal orbits.

84. Doubtless, the great astronomical question to be decided in the present day, is the place and motion of the sun : nor can we have a true system of astronomy, whilst it is imagined—*contrary to all analogy* in the heavens—

that the sun is wandering through space, with all his planets following, round some distant centre, not yet discovered, but supposed to be round the Pleiades—or near it—a circuit which would not be completed perhaps in thousands of years: whilst we find other suns or stars to have orbits, in which they move in the space of a few hours.

85. To avoid confusion in the preceding calculations of the orbits of the planets, we omitted taking into consideration, how far one planet may be projected by the planet before it, in addition to the distance it is carried by its centrifugal force; neither have we considered whether those planets which have satellites, may not, in consequence, be carried out further from the sun; such calculations would probably fix with great accuracy, the distances of the orbits of the planets from the sun.

86. With regard to the planets Uranus, and Neptune, it would be necessary to calculate their distances *from the earth*, like those of the other planets, instead of determining their distance by an *imaginary* law, which *supposes*, that each planet is twice the distance of the planet before it: for in-

stance, Saturn was twice as remote as Jupiter, and therefore Uranus was *supposed* to be at double the distance of Saturn from the sun, and Neptune twice as remote as Uranus. Now it would become necessary, not only to find their distances from the earth, but also the precise diameter of these planets, before any accurate calculation could be made, as to the distance from the sun to which their centrifugal force would carry them ; nor is it improbable that Neptune might be found to be the smaller planet of the two, and therefore the nearest to the sun. It is very probable that these planets are not so large as they are estimated to be, and that, in fact, they belong to the group of new planets, or planetoids.

87. When we survey the heavens—the various constellations, and clusters of stars united together by the whirl of atmosphere, created by a rapid motion in their orbits ; and more particularly, those wonderful groups of stars—the united light of which appear but like a faint nebulae, and some of which are altogether invisible to the naked eye, though consisting of many millions of stars—each group a universe in itself ; we cannot but feel more forcibly than ever, that centrifugal force *must be* the great law of motion throughout

the universe. It is, indeed, *admitted* by astronomers, that "*there is no particular condensation to indicate the existence of a central force*" in these groups of stars. These nebulae have every variety of form, some are round, some oval, and some branching out in every direction ; others like luminous rings with dark spaces in the centre, as if all the stars were carried *outward* by their united centrifugal force, thus forming a ring, composed of millions of stars ; like the milky way, that brilliant zone in which our sun is placed, and which is supposed to be but one of the nebulae.—Well may we be lost in amazement at the immensity of creation !

88. Now were attraction, or gravitation, the great law of motion—impressed upon the material universe—that is—were all matter tending towards a universal centre—the end would be a condensation of the whole mass of suns, planets, and satellites, and consequently, the total destruction of this beautiful creation. But the All-wise Architect of the heavens, has ordained unerring laws for the regulation of his wonderful creation ; "for he has given them a law which shall not be broken." Ps. cxlviii. 6. And though the work of creation may be going on throughout the universe—as we

have reason to think it is in the solar system—yet, if centrifugal force be the great law by which the universe is governed, there is nothing to be apprehended. Outward they may for ever tend, for they find no barrier ; still outward and there is nothing to impede their progress—Nothing, save interminable regions of infinite space ! where the work of creation may continue throughout eternity—Eternity !—what is it ?—

“ We comprehend a *future* without end ;
 We feel it possible, that even yon sun
 May roll for ever : but we shrink amazed—
 We stand aghast, when we reflect, that Time
 Knew no commencement !”—————

No *more* can we finite creatures, comprehend the infinite All-wise God, “ who created all things, and who was before all things.” Prov. viii. 22—27. “ From everlasting to everlasting thou art God.” Ps. xc. 2.

“ But God, who commanded the light to shine out of darkness, hath shined in our hearts, to *give* the *light* of the *knowledge* of the Glory of God, in the face of Jesus Christ.” 2. Cor. iv. 6. “ Who is the image of the invisible God, the

first-born of every creature ; for by him were all things created, *that* are in heaven, and that are in earth, *visible* and *invisible*, whether they be thrones, or dominions, or principalities, or powers : all things were created by him and for him ;—"For it pleased the Father that in him should all fulness dwell ; And having made peace through the blood of his cross, by him to reconcile all things unto himself ; by him, I say, whether they be things *in earth*, or things *in heaven*." Col. i. 15—20.

FINIS.



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